

Approx. 1,100 words

IDRC-F171e

AMAZON ROULETTE: DESTRUCTION OR DEVELOPMENT?

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The Amazon River Basin's territory of more than 700 million hectares is shared by six Latin American countries. But although it was scarcely utilized due to its relatively poor soils, high population density in some areas of the Amazon basin countries is now forcing the migration of agricultural settlers to the jungle, and various development plans are being formulated -- and implemented -- to exploit the region.

The slash-and-burn cultivation practiced by these "spontaneous settlers" may be ecologically stable under low population pressures. During the last two decades, however, an increase in population has been producing an alarming expansion of the areas of forest destroyed which, combined with shorter fallow periods, is resulting in significant damage to the ecological system. In the central jungle of Peru alone, it has been estimated that, each year, some 3000 new settlers destroy 20,000 hectares of natural forest.

Various ecologists are predicting disaster should the destruction continue, not only for the Amazon itself, but also for the rest of the world, as tropical moist forests are a significant source of oxygen.

What, then, are the alternatives? First and foremost, it must be realized that Amazonia is not a unique phenomenon in our world. Similar hot, steamy, rain forests cover, or at one time covered, vast expanses of Borneo, New Guinea, Indonesia, northern Australia, Indochina, parts of

India, Ceylon, Madagascar, central and western Africa, some areas of Central America, and of Colombia. However, because of its enormous surface area and the singular characteristics of the river and basin, Amazonia attracts the lion's share of world attention.

Nor is there one Amazonian ecosystem. In studies restricted to the *Hylea* or forest zone of the Amazon basin, three ecosystems are identified: the *terra firme* -- solid ground; the *varzea*, swampy areas along the river banks that flood during the rainy season; and the perpetually waterlogged *igapos*, fed by "black water", "white water", and "clear water" rivers, each representing an aquatic ecosystem which in itself is worthy of further study. The ecosystems of the total Amazon, are far more complex than this, however, and have yet to be thoroughly studied and classified.

In short, Amazonia is a vast expanse of flatlands covered with different types of forests and savannahs. All of it is practically at sea level: from Iquitos, on the Peruvian border, until it joins the ocean, the Amazon river drops only 65 metres. The plentiful animal life in the forest is concentrated 50 metres up and sometimes higher. The forest floor, that shadowy habitat of shade-seeking vegetation, is surprisingly clear of thickets and undergrowth and few birds or mammals intrude on this, the headquarters of the jungle's rich insect life. The soft, constant trickle of nutrients released by the soaked foliage enriches the soil with potassium, magnesium, phosphorus, and other oligoelements. Here then, is the secret alchemy of the rain forest: the nutrients that cannot be provided by the subsoil are filtered by the arboreal umbrella from the heavy rain which, depending on the area, many vary from 1500 to 3000 mm annually, by a continuous litter fall and absence of leaching.

The soil is generally poor and lacking in minerals, but the constant rainfall and average temperatures of 25°C, with only 3°C variation between the hottest and coolest months, help the forest to salvage such meager nutrients as can be recycled in its intricate photosynthetic laboratory and labyrinthine root networks. In the gigantic vegetation of the *Hylea* we see towering strength born of fragility, the ingenious exploitation of meager resources in impossible conditions.

#### The controversy

The awareness of the economic and social development that is sorely needed if living conditions of more than half the world's population are to improve and the further realization that most of these people inhabit the tropical zones of the earth, has given rise to a passionate controversy over the development of tropical and equatorial forests.

Amazonia cannot help but play a key role in any such discussions because it lies at the very heart of the controversy. Two opposing camps have been defined -- the ecological versus the economic, their extremes tempered by several intermediate stances aimed at arriving at regional or economic compromises.

For the members of the ecological camp, Amazonia, with its complex network of fragile ecosystems, cannot now and will at no time gracefully incorporate the advances of modern civilization -- intensive agriculture and cattle-raising, high-density urban and rural settlements, roadways, and industrial development. Specific reasons have been advanced by many specialists to explain why such a transformation would be difficult.

First, Amazonia is an "illusory paradise". Its highly acidic soils, laced with laterite and practically devoid of humus because of the relentless heat, would be quickly destroyed under the direct impact of rain should the arboreal canopy be removed. Thus exposed to the burning rays of the sun, the soil would bake as temperatures rose swiftly from 18° to 40°C and higher, until it became as hard as rock. When broken up by ploughs or hoes in preparation for planting, the soil quickly erodes, muddying the river waters, damaging aquatic life, and contributing to sedimentation downstream.

Second, the tree species growing in the area are of limited commercial value. The hardwoods that could be profitable are very widely scattered, making the transportation of logs and other forest products slow and unwieldy.

Also, endemic diseases, while tolerated by indigenous populations, are the scourge of potential colonizers, particularly as preventive medicine or medical care is not available.

Those for whom the destruction of Amazonia is a necessary first step in its transformation argue that while the *terra firme* soils may indeed be poor, the 60,000 square kilometres of *varzea* swampland flanking the river are nurtured, like the ancient Nile, by the sediment and nutrients deposited by the floodwaters of the "white water" rivers from the foothills of the Andes. The hot climate and heavy rainfall should guarantee favourable conditions for subsistence and even commercial farming, provided appropriate methods and fertilizers are used. Profitable cattle-raising ventures would also be feasible if tropical grass was planted, certain breeds of cattle refined and adapted, and strict sanitary controls imposed.

Furthermore, the year-round solar radiation would ensure highly productive agrosystems and offers a plentiful, inexpensive source of energy for domestic and community needs. The rivers, if properly harnessed, also could provide

electric power for human settlements and serve as excellent communication systems, once waterways are dredged, canal systems and floating piers devised, etc. Roads could be opened up in those areas where transportation by water is not feasible.

If it is further argued that reforestation policies can be designed to replenish forest areas which have been cleared, and that the health risks can be averted with medical care, hygiene, and good nutritional habits, clearing the way for human settlements.

For the preservationists, any attempt to exploit the supposed riches of these ecosystems can only be described as Amazon roulette. The destruction of existing ecosystems would upset all manner of delicate ecological balances, they say, and would entail the irreversible destruction of an enormous source of oxygen which is crucial for the survival of the biosphere.

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May 1981